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HYDATID CYSTS OF THE LUNG

BY

F. GUY GRIFFITHS, M.D.,

Honorary Pathologist and Honorary Assistant Physician, Royal North Shore Hospital of Sydney; Honorary Physician Anti-Tuberculosis Dispensary, Sydney; Member N.S.W. Government Tuberculosis Advisory Board; sometime Honorary Acting-Pathologist, Sydney Hospital, Sydney.

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HYDATID CYSTS OF THE LUNG.

By F. Guy Griffiths, M.D., Sydney.

Echinococcus hydatidosus is the cystic stage of taenia echinococcus. In the lung, as in other organs, it may or may not produce daughter cysts, though the absence of daughter cysts (sterile single cyst) is the more common. The daughter cysts may bud endogenously or exogenously; in the former case (echinococcus hydatidosus) round or oval cysts result; the exogenous method of proliferation giving rise to echinococcus granulosus, is common only in animals (*Echinococcus veterinorum*).

The echinococcus alveolaris or multilocularis, due to a different parasite, the taenia echinococcus alveolaris of Posselt, and growing, sometimes into spherical, more often into irregular masses may occur in the lung; this variety of echinococcus is rarely seen except in Southern Germany, and even there seldom, except in the liver or the bones.

Of all cases of hydatids about 10 to 15 per cent. occur in the lung (West, Thomas, MacLaurin, *A.M.G.*, 1907, p. 502). In the lung the cyst wall is thin and poorly supported by the surrounding tissue. This thin adventitious cyst has special relations to arteries, veins, and bronchi, the last often opening directly into it. The lung is vulnerable, and a further peculiarity results from changes liable to occur in it, *i.e.*, pericystic pulmonary congestion, which may sometimes give rise to haemoptysis, and even pneumonia, and to pericystic sclerosis. The hydatid cachexia (weakness, wasting, anorexia, etc.), is considered by some authors to appear earlier in lung than in liver cases. Degenerative changes sometimes occur, death of the parasite

with inspissation of the contents which become colloid, caseous or even calcareous, the cyst shrivelling up.

Symptoms and Course.—In its early stage pulmonary hydatid is compatible with perfect health. Any of the following phenomena may occur:—

1. *Cough.*—At first usually dry and jerky; later it may be very distressing.

2. *Ill-defined uneasiness* or actual pain; this latter is far from being invariable.

3. *Haemoptysis.*—(*a*) In an early stage, even when the cyst is less than a pea in size, haemoptysis may result from congestion of the surrounding lung; (*b*) with rupture of the cyst occurring either naturally or as a result of an operation, violent, even fatal, bleeding may occur; (*c*) occasionally repeated haemorrhage may persist for months, or years, after rupture. Just as haemoptysis may result from the congestion in the lung surrounding an hydatid of the lung, so, too, it may be caused by the congestion of the lung produced by an hydatid in the liver or even in the spleen forcing its way up into the thorax. (Trousseau; Harbison, *A.M.G.*, 1900, p. 279; Griffiths, *A.M.G.*, 1910, p. 414).

4. *Pleurisy* in the serosa over the cyst with or without effusion.

5. If the cyst grow outwards towards the wall of the chest, it may simulate pleural effusion or may cause erosion of bone and *arching of the thorax,* and rarely may point and burst externally.

6. *Dyspnoea.*—If the cyst be very large or near the hilus.

7. If the parasite die the cyst shrinks, and its contents become colloid or calcareous.

8. *Pneumonic Attacks.*—Diffuse or massive pneumonia, sometimes resembling frank lobar pneumonia.

9. *Rupture.*—Rupture of the cyst may occur—(*a*) Into the adventitious cyst; (*b*) into a bronchus, generally the result of (*a*); this may result in spontaneous cure; (*c*) into the pleura, often with fatal result; or (*d*) into both bronchus and

pleura leading to pneumo-thorax or pyopneumo-thorax.

As a rare complication rupture into other organs may occur, thus Jamieson and Jenkins (*A.M.G.*, 1897, p. 598) have described rupture of "an hydatid cyst of the thorax" (? of the lung) into the heart (auricle), leading to instant death; cases have been recorded also into the pulmonary vein, pericardium, etc. The rupture may be insidious, *i.e.*, a fissure occurs in the cyst wall, and this often results in a septic infection of the cyst with foetid bronchitis and other grave sequels. Sometimes the rupture is sudden; a "vomica" occurs with violent haemorrhage, and the expulsion of fluid containing scolices, hooklets, and large or small pieces of the membranous cyst wall showing the characteristic lamination, and sometimes of vesicles (grape skins, or gooseberry skins). According to Lendon the fluid and membrane have a characteristic taste. After partial or complete expulsion of the contents, the cavity is partly obliterated by the expansion of the surrounding lung, which had been compressed by the cyst, unless such expansion be hindered by pericystic sclerosis. If all the cyst be expelled, any cavity remaining loses its special hydatid characteristics.

10. *Urticaria.*—Probably due to absorption of fluid; yet McMurray (*A.M.G.*, 1896, p. 185) has recorded a case in which pale red, extremely irritating papules persisted for two years before the discovery of the "unruptured cyst," and disappeared spontaneously immediately after operation.

11. *Changes in the Blood.*—(*a*) Eosinophilia, (*b*) anti-bodies in the serum (see below under diagnosis).

12. *Secondary infection* with hectic fever (usually the result of fissured rupture, see 9 above) and *purulent expectoration.*

13. *Tuberculosis* may occur as a secondary infection either in the neighbourhood of the cyst or at a distance (Dieulafoy, p. 227, Elenevesky, Lendon).

14. *Hydatid cochexia* is said to develop earlier, and to be more marked in the case of the lung than of other organs; often, however, the patient appears in robust health.

Physical Signs.—In many cases, even when the cyst has attained quite a large size, there may be practically no signs. This is especially the case when the cyst is deep-seated. At other times the following may be observed:—

Dulness.—Sometimes typically circular in outline over the circular area in which the spherical cyst meets the chest wall.

Hydatid Thrill or Fremitus.—A sign, however, which, by no means invariable in hydatids of other regions, is quite uncommon in thoracic cases, and which occurs in a number of other conditions, *e.g.*, hydronephrosis, some cases of pleurisy, hydro- or pyopneumothorax (and according to Benarbei may sometimes be elicited over thick muscles (*D.M.W.*, 1907, p. 652).

Over the dull region vocal fremitus and *breath sounds may be feeble* or absent, and, in some cases, there may be exquisite *pectoriloquy*.

Nearby *pleuritic friction* may be heard or *fine crackles* in the compressed line.

If the cyst be large the heart and other organs may be displaced.

Of X-ray examination, aspiration, etc., I speak later.

Santini described a "*booming*" which might be heard on combined percussion and auscultation. If the unruptured cyst be very large the intercostal spaces may be obliterated, and the chest wall may bulge; more rarely we may find such signs as dysphagia, difference in the pulses, etc.

Other special signs may be associated with complications, *e.g.*, foetid expectoration, pleural effusion, urticaria. After rupture, we get the signs of a cavity, and if sepsis occur râles and rhonchi. In far advanced cases as in other forms of lung disease, clubbing of the fingers is seen.

We may thus recognise the following stages: (1) Symptomless intact cyst; (2) intact cyst producing symptoms of pressure, congestion or toxaemia; (3) uninfected ruptured cyst; (4) infected ruptured cyst (hydatid phthisis); (5) healed cyst. Dr. A. A. Lendon, of Adelaide, discusses these elaborately, and extends the classification.

Diagnosis.—In making the diagnosis we have the following aids: (1) Diagnostic tuberculin test; (2) X-ray examination; (3) blood examination, (*a*) cellular, (*b*) humoral.

1. Of the *tuberculin test* I do not propose to speak now. I discussed the exclusion of tuberculosis in a previous paper (*A.M.G.*, 1910, p. 410).*

2. *X-ray Examination.*—Hydatid fluid is opaque to the X-rays, and so the cyst throws a shadow on the fluorescent screen, or photographic plate—a shadow particularly easy to observe in the case of hydatid of the lung. I understand that Dr. L. H. Harris intends to discuss this point this evening. He is much more competent than I, and I shall therefore limit myself to a few short statements. An unruptured cyst, unless deformed by hard structures beside it, throws a round, regular, rather sharply defined shadow. Where two cysts lie side by side their adjacent surfaces are flattened (see the skiagram in Souligoux of the case of Albertin and Barjon). A ruptured cyst full of fluid throws a shadow round and sharply defined below, and level (straight) above; the empty ruptured cyst is nearly round, with dark circumference and lighter interior. In the case of old cysts, shrunken and cicatrised, either unruptured and inspissated or ruptured and partially filled with more or less blood-clot, the shadow is dark but less sharply defined, and has an irregular outline.

3. *Blood Examination.*—It was, at one time, thought, nay publicly proclaimed, that hydatids could be easily diagnosed, as they always produced an *eosinophilia.* Unfortunately they do not Eosinophilia, like urticaria, occurs irregularly, most often in association with absorption of hydatid fluid; when it does occur it is useful, but its absence indicates nothing. I shall not repeat now what I said on this matter several years ago (*A.M.G.*, 1906, p. 406).

It was hoped that the *precipitin reaction* would aid in the diagnosis of hydatids; this also has been disappointing.

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*See also Wilkinson, "Tuberculin in the Diagnosis and Treatment of Tuberculosis." London, 1912, pp. 109, 148, 150.

Weinberg's Reaction.—Recently it has been found that the human organism, in response to the irritating presence of hydatids, produces anti-bodies which circulate in the blood and are discoverable by deviation of the complement (Bordet-Gongou phenomenon). When the cyst has ruptured or been incised, and no more antigen is absorbed, the antibodies soon fail in the blood. At first successful cases only were recorded, but recently several failures of this method of serum diagnosis have been announced; fortunately it appears that an improved technique will obviate them.

By the aid of such tests, cases may sometimes be discovered in the earliest stage, *i.e.*, with health or only slight discomfort. Usually, however, they present themselves for diagnosis in one of the following six conditions:—

1. Hemorrhage from congestion in the lung near a small, unruptured cyst suggests tuberculosis. If this be not excluded by an injection of tuberculin, it may be months or even years before the true diagnosis is made.

2. After an attack apparently of frank lobar pneumonia, basal dulness is discovered, and at first supposed to be due to unresolved pneumonia; X-ray examination at once reveals hydatid cyst.

3. The symptoms may be those of typical pleurisy with effusion; in fact the simulation may be so exact that it is only, when after aspiration the fluid is found to be clear, limpid, of low specific gravity, and containing little albumin and much sodium chloride, that one knows one is dealing with an hydatid. The presence of a pleural effusion in addition to the cyst may make confusion worse confounded. In the same way a suppurating cyst simulates encysted empyema.

4. In other cases the patient gives a history of chronic lung disease, associated with wasting, and the diagnosis has to be made from advanced tuberculosis or bronchiectasis. Here the negative tuberculin test, the history of sudden and copious expectoration, the unusual situation of the cavity, the presence of hydatid debris (hooklets, daughter cysts or shreds of membrane) in the expectoration, aid in the diagnosis, or the peculiar taste of the sputum and the X-ray

shadow may be the only clues. If there be many daughter cysts one should suspect that the case arose in the liver and afterwards bulged into the lung; there is then usually bile in the sputum. The complication of hydatid by tuberculosis (Dieulafoy) may make the diagnosis almost impossible.

5. It is rare nowadays to see cases in which the unruptured cyst bulges the thoracic wall.

6. When gangrene or foetid bronchitis follows fissured rupture the case is liable to be confused with post pneumonic abscess or gangrene or foreign body in the lung.

The following case histories illustrate some points.

Mr. H., in November, 1908, had cough, loss of weight, and languor. He reacted to tuberculin, and under treatment gained weight and strength, till in May, 1909, he was restored apparently to complete health. After exertion he had a severe haemoptysis, about a pint, and this was followed three weeks later by a second two pints, in the course of which he expelled the typical, laminated hydatid cyst wall. He was seriously ill for several weeks, but made an excellent recovery. In July, under the X-rays, a shadow could be seen in the lower part of the right side of the chest, about two inches above the diaphragm. Seven months later this shadow was less evident, but could still be seen. Meanwhile the patient had had further tuberculin treatment, and gained nearly two stone in weight. In August, 1912, he was in robust health, and had had no relapse of any kind.

Mr. R. (see *A.M.G.*, 1910, p. 413), pulmonary symptoms, no reaction to tuberculin (.01 cc. old T. given subcutaneously). X-ray shadow of hydatid; operation, cyst not found; six weeks later spontaneous rupture and cure.

Miss X, in 1901, had pain in the chest, with the usual symptoms and signs of pleurisy with effusion. Three medical men had no doubt of the diagnosis. She was aspirated, the fluid found to be clear, of low specific gravity, and containing no albumin. Although the aspiration was made under strict asepsis, the cyst, probably infected from a bronchus, suppurated.

Under an anaesthetic it was incised by an experienced surgeon, and she died before the operation was completed.

Mr. W. (No. 1) had pleurisy and pneumonia in 1909, and subsequently coughed up a "quart and a half of white matter," and from time to time thereafter expectorated phlegm tinged with blood. He was seen by Dr. Shellshear, of Gunnedah, and sent by him to a city hospital, where he was assured that nothing was the matter with him, but as he was observed to spit blood, and as Dr. Shellshear insisted that he was ill, he was transferred to a sanatorium, where he gained weight. On leaving there six months later he was assured that he was quite cured, although he still had occasional slight haemoptysis. As neither he nor Dr. Shellshear was satisfied with the statement that he was in perfect health, the latter sent him to me for examinaion. I suspected hydatid, and asked Dr. Harris to apply the X-rays. We found the irregular dark scar of an old cyst in the centre of the left lung, and the smooth, round, sharply defined shadow of a large unruptured cyst in the right lung. Thus, an X-ray examination enabled us to make, at a glance, a diagnosis which had been in doubt for two and a half years. Physical examination repeated after the X-ray examination failed to detect any signs, except pectoriloquy, over the cyst. His cyst appeared deep-seated, and not within ready reach of the surgeon's knife, and no operation was undertaken. He has lately expectorated portions of it.

Mr. W. (No. 2), in April, 1911, had "influenza and pleurisy," two months in bed, and then there gushed out through his mouth and nose about a pint of thin pink fluid, since when he has had frequent blood-spitting. In April, 1912, he came to me for examination, and the only physical signs I could discover in the chest were a little doubtful friction and feebleness of breath sounds in the right back at the apex of the lower lobe. As his time was limited, I did not test him with tuberculin, but proceeded at once with Dr. Harris to an X-ray examination, which disclosed in the left lung an irregular shadow above and to the left of the heart, and two inches further out a very definite round shadow about two inches in diameter, and apparently at least

two inches from the surface. No operation was undertaken.

Mr. M., an exceptionally thick-set and powerful man, while travelling in Europe, about nine years ago, had a severe and obscure attack of lung disease. He saw numerous physicians in London and on the Continent, all of whom failed to diagnose the complaint. During the voyage back to Australia, he coughed up blood and daughter cysts, and on consulting his family doctor in Sydney, the diagnosis was made at once. He was then somewhat recovered, and never submitted to any operation. A year or two later, he was seized with a sudden violent haemoptysis in the street; he sat on the kerbstone, discharging hydatid fluid ("several pints in all") and cysts, and nearly suffocated by several larger cysts which caused temporary blocking of the larynx. The bystanders thought him intoxicated. For years afterwards he expectorated blood or membrane from time to time, but steadily improved in health, and in 1912 weighed over sixteen stone, and was capable of very arduous exertion.

Treatment. Exploratory puncture is not advisable except as a preliminary to thoractomy. Where the cyst is close to the surface of the lung, the operation described by Lendon is dangerous, but may be advisable; if the cyst be deep-seated it is hard to reach, and the great risk of death following operation makes it more prudent to adopt an expectant plan rather than to undertake an operation so very dangerous. Possibly, the use of Saurbruch's pressure chamber may reduce the risk. It is true that Davies Thomas and Lendon, and more recent writers, have recorded numerous successes after incision, but how many fatalities have resulted from operation? Some surgeons have been brave enough to record them, but the vast majority go unreported. In cases of purulent hydatid cavity, if antiseptic inhalations (creosote, etc.) fail, thoracotomy may become advisable. Dieulafoy, Tremearne, Thane, and others have recorded cures by aspiration and injection of antiseptics, but the risk of this procedure makes it inadvisable to adopt it. It not infrequently (according to West, in 70 per cent. of cases) happens that the disease, if left alone, terminates in a cure

either by death of the parasite and inspissation of the contents, or by rupture into the bronchus and vomica. It is possible that intravenous injection of salvarsan might prove an efficient anthelmintic. Atoxyl was suggested by Angas Johnson.

Hydatid of the pleura. Whether or not hydatid ever occurs primarily in the pleura is doubtful. Lendon, West, Vigla, Trousseau and Ziegler say it may; Watson, Verco, and others consider it highly improbable.

Abdominal hydatid penetrating the lung. For a discussion of those interesting cases in which an hydatid of the liver or spleen penetrates upward into the lung, so as to become almost completely surounded by lung tissue, one may refer to Harbison, Shewen, and to the interesting discussion of Trousseau and Lendon.

In the short time at my disposal, it has been possible only to touch on many points; further information may be found in the book or papers cited in the accompanying list.

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Drs. L. H. Harris, G. L. O'Neill, Ayres Vallack, Gordon Craig, Ritchie, Piero Fiaschi discussed the paper.

Dr. Guy Griffiths, in reply, said he thanked Dr. Harris for his kindly reference to Dr. Wilkinson. With regard to Dr. O'Neill's case, he agreed that X-rays were not of much use when the whole of one side of the chest was filled with fluid. There could then be found no characteristic roundness if the cause were hydatid. It was very doubtful if the diagnosis of hydatid of the pleura could ever be arrived at during life, even after exploratory incision. The signs on which Dr. Lendon thought most reliance might be placed were thrill, bulging of the chest wall, and the alteration of the situation of dulness with change of the patient's position. He thought the explanation of partial or even complete asphyxia after aspiration was not oedema of the lung but drowning, as usually described. No matter how complete had been the compression of the lung expansion seemed always possible. He thought Dr. Vallack's suggestion of local anaesthesia valuable. Lendon advised ether, the patient being allowed to come nearly out before the incision was made. The operation should be done in two stages; first removal of a rib in the usual way and careful opening of the pleura. If there were no adhesions the cyst wall should be stitched to the parieties and the incision delayed until adhesions had formed. Where

the cyst wall was already adherent the whole operation could be completed in one stage. Although hydatids are much more common in South Australia and Victoria than in New South Wales, Lendon writing before the days of X-rays, apparently recognised superficial cysts only, and assumed that they could always be reached without it being necessary to penetrate deeply into the lung. With regard to the danger of aspiration as emphasised by Dr. Craig, Lendon was of opinion that the size of the exploratory needle was almost immaterial, the cyst wall being liable to be torn however small the needle the elastic wall then curled inward, opening a space between the ecto-cyst and the adventitious cyst, and fluid entering this space, escaped into the bronchus which so frequently was in open communication with the adventitious cyst. Where hydatids were common, it was as well always to be prepared to find that what appeared to be a simple pleural effusion was a hydatid, and if so, to open the chest freely at once, even if the only means were to stab the patient with a pocket-knife. He learnt with great interest of Meltzer's insufflation anaesthesia as described by Dr. P. Fiaschi. Sauerbruch's chamber was described in Sauerbruch's beautifully illustrated work, a copy of which he handed round for inspection, and also in the Quinquennium of Medicine and Surgery.

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